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TITLE: HIGH-GLOSS PAPER FOR GRAVURE PRINTING

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## ABSTRACT:

PROBLEM TO BE SOLVED: To obtain a gravure printing paper of excellent sophisticated feeling.

SOLUTION: This gravure printing paper is obtained by coating the obverse and/or reverse face(s) of a basal paper with a coating liquid containing a hollow organic pigment 0.2-0.5  $\mu$ m in particle size followed by drying and then subjecting the coated surface(s) to supercalendering.

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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 03/28/2008 / Priority: 1. Chemistry / 2. JIS (Japan Industrial Standards) term / 3. Mathematics/Physics

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**FULL CONTENTS**

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**[Claim(s)]**

[Claim 1] Are the gravure paper used for gravure and [ at least one side on the back of front of a base paper ] High gloss paper for gravure which the hollow organic pigment whose grain sizes are 0.2 micrometer - 0.5 micrometer, and an aspect ratio coat the coating slip containing the DERAMINETO clay of 30-60, dry, and is characterized by having carried out super calender treatment of the coating side, and being manufactured after that.

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**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention relates to the high gloss paper for gravure with high blank paper gloss and printing gloss especially about the gravure paper used for gravure.

**[0002]**

[Description of the Prior Art] From the former, minute and gravure which is kinds of intaglio printing as a printing means by which printed matter with a high-class feeling is obtained, such as a poster, a calendar, and a high-class photograph collection, are known well. In recent years, the printed matter which has a high-class feeling more is required, and highly minute-ization of gravure technology is progressing. In connection with it, a dry down is low and the demand of the gravure paper with a high-class feeling is increasing.

[0003] Generally, in order to raise the high-class feeling of printed matter, it is known that it is effective to make the gloss of a print sheet high, and various proposals are made from the former about the technology for raising the blank paper gloss and printing gloss of a print sheet.

[0004] For example, it is with the dry state a coating and after drying about the coating

constituent which includes the cast coat method welded by pressure and dried and a thermosoftening organic pigment in the metallic mirror plane drum which had the coating layer heated after coating the coating slip which makes a pigment and adhesives a principal component on the surface of a base paper. The method (JP,1-148898,B ) of welding by pressure to the hot mirror plane roll surface more than the softening temperature of a thermosoftening organic pigment etc. is known.

[0005] Blank paper gloss and printing gloss are high, and the print sheet obtained by such conventional technology has a high-class feeling.

[0006]

[Problem(s) to be Solved by the Invention] However, each print sheet obtained by the above-mentioned conventional technology is mainly developed for Toppan Printing. In intaglio printing, in order to make paper fully transfer the ink in the cell of a version, high smoothness is called for. It is required in highly minute printing especially like gravure also in intaglio printing that a dry down should also be small.

[0007] Since a direct heating drum is made to stick by pressure and dry the coating layer in a damp or wet condition by the former cast coat method, an opening is made in a coating layer, it is low and the dry down of the smoothness of the print sheet obtained to which printing ink permeates said opening from immediately after printing, and ink concentration and printing gloss fall gradually is also large.

[0008] [ moreover, the print sheet obtained by the method indicated by latter Japanese Patent Publication No. 1-148898 ] Although the portion which exists in the coating layer surface or a nearer portion by a high temperature calendar process serves as very precise structure according to modification of an organic pigment, since an opening is made in inside as for it, a dry down is not prevented. And by this method, since a high temperature calendar process is carried out, in response to the influence of the conditions of a base paper, nonuniformity is made in a coating side, and smoothness also becomes low.

[0009] Thus, the print sheet which has the glossiness acquired by the conventional technology was not what is suitable for gravure from fields, such as smoothness and a dry down.

[0010] Then, the main technical problem of this invention has smoothness in blank paper gloss and printing gloss offering the high gloss paper for gravure which has a high-class feeling highly suitably [ it is high and ] for gravure by there being no development of a dry down.

[0011]

[Means for Solving the Problem] Invention according to claim 1 which solved the above-mentioned technical problem is a gravure paper used for gravure. The coating slip to which the hollow organic pigment whose grain sizes are 0.2 micrometer - 0.5 micrometer, and an aspect ratio contain the DERAMINETO clay of 30-60 at least in one side on the back of front of a base paper is coated. It is the high gloss paper for gravure which dries and is characterized by

having carried out super calender treatment of the coating side, and being manufactured after that.

[0012] (EFFECT OF THE INVENTION) Since the organic pigment used for this invention is thermoplasticity, by carrying out super calender treatment, gloss is discovered in a coating layer and it serves as a high gloss print sheet. Moreover, since it was considered as the hollow organic pigment, it changes easily by super calender treatment, and the coating side where smoothness is high is formed. And since a hollow pigment changes easily, even if it carries out a calendar process, influence of the conditions of a base paper is not received. furthermore, since the grain size was used as the small hollow organic pigment, an opening becomes empty -- it is lost, the structure inside the coating layer surface and a coating layer becomes more precise, and a dry down is also improved. And since the aspect ratio made the DERAMINETO clay of 30-60 contain in said coating layer, a feeling of gloss reinforces and there is a high-class feeling more.

[0013]

[Embodiment of the Invention] Below, the form of operation of this invention is explained in full detail. The result of having repeated examination wholeheartedly in order that this invention person etc. might manufacture the high gloss paper equipped with the aptitude as a gravure paper, When the specific hollow organic pigment and specific aspect ratio of a grain size coat the coating slip which blended the DERAMINETO clay of 30-60 to at least one field on the back of front of a base paper and carry out super calender treatment of the coating side after desiccation Printing gloss is small high, there is no gloss nonuniformity, a dry down carries out the knowledge of the high gloss paper for gravure which is moreover excellent in gravure aptitude being obtained, and it came to complete this invention.

[0014] The hollow organic pigment used for this invention is 0.2 micrometer - 0.5 micrometer in grain sizes. In less than 0.2 micrometer, a grain size is inferior to gloss discovery nature, in order that modification may not fully progress by super calender treatment, and smoothness does not become high, either. Since it is inferior to the stability of a water dispersing element when it exceeds 0.5 micrometer, the rise of coating slip viscosity is caused, and it becomes the cause of producing the turbulence of a coating side, and smoothness falls. In a dense type organic pigment without an opening, since it is hard to change by super calender treatment, it is necessary to carry out in a hollow type organic pigment.

[0015] Moreover, as for said hollow organic pigment, it is desirable for glass transition temperature to be 100-150 degrees C. A coating, when drying [ coating slip ], in order that modification and weld of pigment grains may progress at less than 100 degrees C in glass transition temperature, the dimension height of a coating layer falls and the gloss discovery nature after super calender treatment is low. Since the super calender treatment in high temperature is needed when the hollow pigment over 150 degrees C on the contrary is used,

discoloration of a base paper arises and a feeling of white gloss falls.

[0016] When all the pigment components contained in a coating slip are made into 100 weight parts, it is suitable for said hollow organic pigment to consider it as 5-20 weight part.

[0017] Combination number of copies is inferior to the deformans at the time of a calendar process by less than five copies, and a high gloss coating layer is hard to be obtained. Since coating slip viscosity will rise if 20 weight parts are exceeded, the coating in coating equipment becomes difficult. Moreover, it is in the tendency in which the rise of blank paper glossiness carries out level off.

[0018] Furthermore, an aspect ratio also makes lamination clay contain by that of 30-60 in a coating slip in this invention. By combining this DERAMINETO clay, glossiness reinforces and it becomes high gloss more. When all the pigment components contained in a coating slip are made into 100 weight parts, it is suitable for said DERAMINETO clay to consider it as 15 - 25 weight part.

[0019] In the coating slip concerning this invention, in addition to said hollow organic pigment and said DERAMINETO clay The known pigment may contain Clay, calcium carbonate, a satin white, titanium oxide, aluminium hydroxide, zinc oxide, barium sulfate, calcium sulfate, silica, activated clay, diatomaceous earth, lake, etc.

[0020] moreover, as adhesives used for the coating slip concerning this invention A styrene butadiene system, styrene acrylic, an ethylene vinyl acetate system, A butadiene methyl methacrylate system, a vinyl acetate butyl acrylate system, Various copolymerization of \*\* and polyvinyl alcohol, a maleic anhydride copolymer, Natural system adhesives obtained by carrying out flash plate dry cleaning of constructional system adhesives, such as acrylic acid and a methyl methacrylate system copolymer, oxidized starch, esterification starch, enzyme denaturation starch, or them, such as cold-water soluble starch, casein, and soybean protein, are mentioned. these adhesives -- 5 per pigment 100 weight part - 25 weight part -- it is more preferably used in the range about 6 - 15 weight part. A lure and a suitable coating layer are not formed for an adhesive property in case of under 5 weight parts. It comes to be inferior to glossy discovery with their being more than 25 weight parts on the contrary.

[0021] Moreover, in the coating slip concerning this invention, various assistants blended with the usual pigment for coated paper, such as a dispersant, a thickener, a water retention agent, a defoaming agent, a water resistant additive, and a colorant, may contain if needed.

[0022] the coating equipment in which the coating of a coating slip is common, such as blade coater, an air knife coater, a roll coater, brush coater, curtain coater, bar coater, photogravure coater, and size press coater, -- a base paper top -- much more -- or it can divide into a multilayer and can coat to one side or both sides.

[0023] Although it is generally 40 to 70 weight %, the solid content concentration of said coating slip has 45 to 65weight % of a desirable range, when the operability of coating

equipment is taken into consideration.

[0024] moreover -- not being limited in particular for the paper-making method although the base paper of a paper base with a basis weight of 30-400g/m<sup>2</sup> or a board base used for the coated paper for printing common as a base paper is used -- acid paper making and alkaline paper making -- you may be any.

[0025] Raw material pulp in particular of a base paper is not limited. It can be considered as the nonwood pulp of the origin, such as mechanical pulp, such as chemical pulp like known KP, PGW, SGP, RGP, BCTMP, and CTMP, deinking pulp, recycled pulp or a kenaf, a bamboo, hemp, and straw, etc. These pulp may be used independently, and may mix and use two or more sorts. Since it will become whether a base paper is \*\* if the pulp with which said PGW was combined especially about 3 to 10weight % is used as a raw material, it becomes the high gloss paper for gravure which has a high-class feeling more.

[0026] Moreover, as for the high gloss paper for gravure of this invention, it is desirable for especially suitable mirror reflection type smoothness to evaluate the smoothness of an intaglio-printing paper to be 80% or more suitably 50% or more in 20kg/m<sup>2</sup> at the time of pressurization. What is necessary is just to adjust the amount of coatings of a coating slip, and the roll pressure of a calendar process, in order to consider it as this range.

[0027] Although about 10-50g/m<sup>2</sup> of the amounts of coatings of the coating slip to said base paper are coated with dry weight, it is most desirable to be adjusted in 12-35g/m<sup>2</sup> from the field of the blank paper quality of the coated paper obtained. a lure coating layer being hard to be formed in the covering nature of a base paper, and also discovering smoothness in response to the influence of the formation of a base paper, if it is less than 10g/m<sup>2</sup> -- \*\*\*\*\* -- \*\* Elasticity is lost on the high gloss paper for gravure obtained as it is 50g/m<sup>2</sup> or more on the contrary, and it stops being excellent in printability. Moreover, it becomes a cost overrun.

[0028] the roll pressurization conditions of super calender -- a linear pressure -- 100 - 400 kg/cm -- it is more preferably adjusted in the range of 150 - 350 kg/cm. Suitable smoothness is not obtained with their being less than 100 kg/cm, but if 400 kg/cm is exceeded, thickness of paper will become thin, opacity falls, and a high-class feeling falls. Moreover, fiber burning arises and a feeling of blank paper gloss falls. Since quality is stabilized, as for the roll temperature of a calendar, it is desirable to process in 50-95 degrees C. A suitable coating layer is not formed at less than 50 degrees C. If it exceeds 95 degrees, fiber burning will arise and a feeling of blank paper gloss will fall.

[0029] As for the high gloss paper for gravure of this invention, on the other hand, it is desirable to adjust the mirror reflection type smoothness in said 20kg/cm<sup>2</sup> of amount measuring pressure power of coatings to 50 to 100%.

[0030] Here, the high gloss paper for gravure of this invention is not necessarily limited to use of only gravure, and can be satisfactorily used also in known printing methods in addition to

this, such as Toppan Printing.

[0031] A work example is given and this invention is concretely explained below to a <work example>. In addition, the part in an example and % show weight part and weight %, respectively.

[0032] Ten copies of hollow organic pigments whose grain size is 0.2 micrometer (trade name; LX407BP / Nippon Zeon Co., Ltd. make), (Work example 1) 65 copies of Clay (trade name; made in [ ENGERU hard company ] ultra White 90/), DERAMINETO clay trade name; High DORAPURINTO / Huber 25 copy, And 0.3 copy of sodium polyacrylate (trade name; made by Aron T40M/Toagosei) is added as a dispersant to 100 copies of mixed pigments of ten copies of calcium carbonate (trade name; made by FMT90/FIMATEC, LTD.). It distributed in water using the cow loess dispersion machine, and the pigment dispersion liquid of 65% of solid content concentration was adjusted. To these dispersion liquid, as a lubricant, 0.3 copy of calcium stearate (trade name; product made from LB2700/modernization study), They are one copy of phosphorylation starch (made by Japan Maize Products), and styrene butadiene copolymer latex (made by Asahi Chemical Industry) 8 as adhesives. The part was blended and the coating slip of 60% of solid content concentration was obtained. this -- blade coater -- the amount of coatings -- 13g/m<sup>2</sup> of one side it becomes -- as -- a coating -- it dried and coated paper was obtained. The super calender of further 11 nips is used and they are a part for the metal roll temperature of 70 degrees C, and speed 450m/, and linear pressure 300 kg/cm. The high gloss paper for gravure which processes and serves as a work example 1 was obtained.

[0033] Five copies of hollow organic pigments whose grain size is 0.5 micrometer about a hollow pigment (trade name; MH5055 / Nippon Zeon Co., Ltd. make), (Work example 2) 65 copies of Clay (trade name; made in [ ENGERU hard company ] ultra White 90/), DERAMINETO clay trade name; High DORAPURINTO / Huber 20 copy, And 0.3 copy of sodium polyacrylate (trade name; made by Aron T40M/Toagosei) is added as a dispersant to 100 copies of mixed pigments of ten copies of calcium carbonate (trade name; made by FMT90/FIMATEC, LTD.). It distributed in water using the cow loess dispersion machine, and the pigment dispersion liquid of 65% of solid content concentration was adjusted. To these dispersion liquid, as a lubricant, 0.3 copy of calcium stearate (trade name; product made from LB2700/modernization study), They are one copy of phosphorylation starch (made by Japan Maize Products), and styrene butadiene copolymer latex (made by Asahi Chemical Industry) 8 as adhesives. The part was blended and the coating slip of 60% of solid content concentration was obtained. this -- blade coater -- the amount of coatings -- 13g/m<sup>2</sup> of one side it becomes -- as -- a coating -- it dried and coated paper was obtained. The super calender of further 11 nips is used and they are a part for the metal roll temperature of 70 degrees C, and speed 450m/, and linear pressure 300 kg/cm. The high gloss paper for gravure which processes and serves as a work example 2 was obtained.

[0034] 15 copies of hollow organic pigments whose grain size is 0.5 micrometer about a hollow pigment (trade name; MH5055 / Nippon Zeon Co., Ltd. make), (Work example 3) 60 copies of Clay (trade name; made in [ ENGERU hard company ] ultra White 90/), DERAMINETO clay trade name; High DORAPURINTO / Huber 20 copy, And 0.3 copy of sodium polyacrylate (trade name; made by Aron T40M/Toagosei) is added as a dispersant to 100 copies of mixed pigments of five copies of calcium carbonate (trade name; made by FMT90/FIMATEC, LTD.). It distributed in water using the cow loess dispersion machine, and the pigment dispersion liquid of 65% of solid content concentration was adjusted. To these dispersion liquid, as a lubricant, 0.3 copy of calcium stearate (trade name; product made from LB2700/modernization study), They are one copy of phosphorylation starch (made by Japan Maize Products), and styrene butadiene copolymer latex (made by Asahi Chemical Industry) 8 as adhesives. The part was blended and the coating slip of 60% of solid content concentration was obtained. this -- blade coater -- the amount of coatings -- 13g/m<sup>2</sup> of one side it becomes -- as -- a coating -- it dried and coated paper was obtained. The super calender of further 11 nips is used and they are a part for the metal roll temperature of 70 degrees C, and speed 450m/, and linear pressure 300 kg/cm. The high gloss paper for gravure which processes and serves as a work example 3 was obtained.

[0035] Ten copies of hollow organic pigments whose grain size is 0.55 micrometer about a hollow pigment (trade name; MH5055 / Nippon Zeon Co., Ltd. make), (Comparative example 1) 65 copies of Clay (trade name; made in [ ENGERU hard company ] ultra White 90/), DERAMINETO clay trade name; High DORAPURINTO / Huber 20 copy, And 0.3 copy of sodium polyacrylate (trade name; made by Aron T40M/Toagosei) is added as a dispersant to 100 copies of mixed pigments of five copies of calcium carbonate (trade name; made by FMT90/FIMATEC, LTD.). It distributed in water using the cow loess dispersion machine, and the pigment dispersion liquid of 65% of solid content concentration was adjusted. To these dispersion liquid, as a lubricant, 0.3 copy of calcium stearate (trade name; product made from LB2700/modernization study), They are one copy of phosphorylation starch (made by Japan Maize Products), and styrene butadiene copolymer latex (made by Asahi Chemical Industry) 8 as adhesives. The part was blended and the coating slip of 60% of solid content concentration was obtained. this -- blade coater -- the amount of coatings -- 13g/m<sup>2</sup> of one side it becomes -- as -- a coating -- it dried and coated paper was obtained. The glossy paper which processes by a part for the metal roll temperature of 70 degrees C and speed 450m/and linear pressure 300 kg/cm, and serves as a comparative example 1 was obtained using the super calender of further 11 nips.

[0036] Five copies of hollow organic pigments whose grain size is 0.3 micrometer (trade name; low PEIKU HP-1055 / Rome & hearth company make), (Comparative example 2) 70 copies of Clay (trade name; made in [ ENGERU hard company ] ultra White 90/), DERAMINETO clay



trade name; High DORAPURINTO / Huber 15 copy, And 0.3 copy of sodium polyacrylate (trade name; made by Aron T40M/Toagosei) is added as a dispersant to 100 copies of mixed pigments of ten copies of calcium carbonate (trade name; made by FMT90/FIMATEC, LTD.). It distributed in water using the cow loess dispersion machine, and the pigment dispersion liquid of 65% of solid content concentration was adjusted. To these dispersion liquid, as a lubricant, 0.3 copy of calcium stearate (trade name; product made from LB2700/modernization study), They are one copy of phosphorylation starch (made by Japan Maize Products), and styrene butadiene copolymer latex (made by Asahi Chemical Industry) 8 as adhesives. The part was blended and the coating slip of 60% of solid content concentration was obtained. this -- blade coater -- the amount of coatings -- 13g/m<sup>2</sup> of one side it becomes -- as -- a coating -- it dried and coated paper was obtained. The super calender of further 11 nips is used and they are a part for the metal roll temperature of 70 degrees C, and speed 450m/, and linear pressure 300 kg/cm. The glossy paper which processes and serves as a comparative example 2 was obtained.